THE INDIAN CADDIS FLIES (*TRICHOPTERA*).

BY

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(*With twelve plates*).

PART VIII.

(*Continued from page* 339 *of Volume* xli, No. 2, 1939).

SERICOSTOMATIDAE McLACHLAN. (*Contd.*).

LEPIDOSTOMATINAE Ulmer (*Contd.*).

Dinarthrum latum Martynov. Pl. 1. Figs. 1-4.

Dinarthrum (*Indodinarthrum*) *latum* Mart., Rec. Ind. Mus., 38, pp. 283-284, figs. 53-54, a-c, 1936.

Martynov describes the species as follows:—

'♂. Punjab. Punj-pul Nullah, about a couple of miles from Dalhousie, on the Dalhousie-Bakloh Road, 6,500 ft., v-27, S. L. Hora.'

'♂. Eastern Himalayas, Darjeeling, 11-vi-14, F. H. Gravely (defective specimen).'

'Similar and related to the foregoing species. Basal joint of the antennae nearly as long as the whole body, armed with two processes in the basal part. Anterior wings as in *D.* (*I*) *punjabicum* Mart., but discoidal cell is longer, the cell between $M_3 + CuA_1$ and CuA_2 much longer, cell $CuA_2 - CuP$, on the contrary, not as extended; anal stripe with spinules and scales, a little shorter and somewhat arcuate.'

'♂. Dorsal plate of the 10th segment short, with irregular hind margin; from the side, the 10th segment is higher than in *D. punjabicum*. Basal joint of the pedes genitales more elongated, second joint more dilated at its end; titillators also curved to the right.'

'Length of body 5-5·3 mm.'

Cotypes in the collection of the Indian Museum, Calcutta, I am unacquainted with this species.

Dinarthrum punjabicum Martynov. Pl. 2. Figs. 1-4.

Dinarthrum (*Indodinarthrum*) *punjabicum* Mart., Rec. Ind. Mus., 38, pp. 282-283, fig. 51, a-b, 52, a-c, 1936.

Martynov describes the species as follows:—

'11♂, 6♀. Punjab, Punj-pul Nullah, about a couple of miles from Dalhousie, on Dalhousie-Bakloh Road, 6,500 ft., v. 27, S. L. Hora.'

'♂. Head and thorax brown above, head transverse. Basal joint of ♂ antennae brown, nearly as long as the thorax and abdomen,

curved, directed forwards and clothed with rufescent hairs and outstanding thickened hairs; it bears at its inner side two processes, the basal long and curved and the second shorter, thread-like, yellowish, annulated with brown. 1st joint of ♂ maxillary palpi long, second shorter, slender. Coxae brownish, legs yellow, or somewhat brownish; tarsal joints darker at their ends. Anterior wings greyish-brown, clothed with yellowish rufous hairs and with black scales before and behind the longitudinal subdiscoidal groove; whitish spots of hairs at the end of SC, somewhat nearer to the base and at the end of M. Venation somewhat resembling that in *D. ferox* McLach.; discoidal cell rather short, but somewhat variable. M weak dividing at the base of discoidal cell into the fore branch, reaching the end of wing, and the weak hind branch soon uniting with CuA to form a common vein, then separating and forming probably $M_3 + CuA_1$. Anal groove or stripe straight, distinct and extending a little beyond the end of DC; basal portions of CuP and of A_1 present; fork 5 (between $M_3 + CuA_1$ and Cu_2) somewhat variable, but usually rather short; apical cell between the ends of CuA_2 and CuP extended, elongated; in the posterior wings discoidal cell sometimes closed by a cross-vein; sparse blackish scales present. In females DC in the anterior wings is also short, CuP, A_1, A_2 and A_3 connected behind by a post-costal vein, running near the hind edge of the wing; forks 1, 2, 3 and 5 present; basal joint of ♀ antennae twice shorter than in ♂, without processes.'

'Abdomen dark brownish.'

'♂. Side pieces of 9th segment with concave hind margins; 9th tergite almost triangular, with dark hind edge; 10th dorsal segment not entire, but divided by a median fissure into two portions, which, from above, are band-shaped, with hind margins nearly parallel to the hind edge of 9th tergite; side portions not projecting above. Second joint of pedes genitales elongated, slightly thickened in its distal portion; end part sub-divided by a small incision above into two small lobes.'

'Penis curved downwards; titillators originating from the left side of the penis; they are rather thick and curved to the right.'

'In ♀ anterior wings DC is also short, forks 1, 2 and 3 beginning at the same level.'

'Length of body 4 mm.'

'*Remarks.*—This species resembles *D.* (*Paradinarthrum*) *longiplicatum* Mart. and *D.* (*P.*) *mesoplicatum* Mart. but differs somewhat in the structure of ♂ genitalia, as also in the venation of anterior wings in ♂.'

Cotypes in the collection of the Indian Museum, Calcutta. I am unacquainted with this species.

Dinarthrena gen. n.

Spurs, 2, 4, 4. In the ♂, the basal joint of the antenna is armed with either one or two processes. Wings clothed with hairs and scales; in the anterior, the post-costal fold varies in length; discoidal cell long and narrow; in the posterior wing, the discoidal

cell is sometimes wanting, possibly aberrantly. Penis-sheaths present. Inferior appendages branched or unbranched; no upright branch at the base.

Genotype.—*D. shanta* sp. n.

Dinarthrena shanta sp. n. Pl. 3. Figs. 1-5.

Insect dark brown. In the ♂, basal joint of the antenna rather short and stout with a claw-shaped, angular branch at the base, somewhat transparent in the type; palpi short, probably two-jointed but obscured under the thick clothing of hairs; anterior wing rather narrow with an acute apex, both wings clothed with hairs and scales; post-costal fold slightly more than half the length of the wing, terminating in a wide cellule and with only one large and rather shallow cellule between it and the posterior margin.

Genitalia ♂.—The apical margin of the ninth tergite produced in a wide triangle with a rounded apex; the dorsal plate is replaced by a pair of strongly chitinized and asymmetric spines arising from bulbose bases, that on the left with a basal spur arising on its upper margin; that on the right, with a small spur before its apex; penis short and curved; sheaths asymmetric, of unequal length; inferior appendages unbranched and terminating in a long, trumpet-shaped, narrow-stemmed, from above, extension arising from a broader basal part armed with various projecting processes; from the side, the extension terminates in a diamond-shaped dilatation.

Length of the anterior wing ♂ 6 mm.

Length of the basal joint of the antenna ·84 mm.

S. Shan States: Road 40 km. E. of Taunggyi, 13-x-1934, R. Malaise.

Type ♂ in the collection of the Stockholm Museum.

Dinarthrena steelae sp. n. Pl. 4. Figs. 1-6.

Insects brownish; in the ♂, the anterior wings are clothed with hairs and scales; there is a scale-lined, longitudinal groove through the centre and the usual fold in the post-costal area; all forks sessile and two large cells in the post-costal region; in the posterior wing, fork No. 1 with a footstalk in both sexes; an additional fork in both wings in the ♀; in the ♂, basal joint of the antenna of medium length, elbowed about midway; in the unique type, membranous with two membranous processes at the base but the remaining joints normal in texture; maxillary palpi two-jointed, basal joint long, terminal joint short; labial palpi, basal joint very short, second shorter than the third; spurs 2, 4, 4.

Genitalia ♂.—Dorsal plate from above, with the centre of the apical margin rounded, margin somewhat serrate, outer angles strongly produced; from the side, tapering to narrow, obliquely truncate apices, with a pair of triangular plates, directed downwards, arising from the centre of the dorsal plate, on the under surface; penis slender, arching downwards; sheaths symmetrically directed tailwards; inferior appendages perhaps two-jointed, stout

at the base, terminal joint partly welded to the basal joint with the apex produced in a small, inwardly directed plate.

Length of the anterior wing ♂ 6.5 mm.

Length of the basal joint of the antenna ♂ 1·9 mm.

Burma: Mishmi Hills, Chhaglon, 5,350 ft., 25—26-ii-1935, M. Steele.

Type ♂ and paratype ♀(?) in the collection of the British Museum.

These two insects, ♂ and ♀, belonging to the same genus and taken in the same locality on two successive days, probably belong to the same species but there is no direct evidence that they have been correctly associated.

I have pleasure in dedicating the species to Miss M. Steele who has devoted much time to collecting insects of many Orders in Burma and Assam.

Agoerodella gen. n.

Spurs, 1, 4, 4. In the ♂, basal joint of the antenna without processes. Maxillary palpi, basal joint very long, terminal short, almost rudimentary. Wings covered with hairs and scales; in the anterior, post-costal fold short, less than half the length of the wing; discoidal cell narrow. Penis-sheathes wanting. Inferior appendages single-jointed and unbranched.

Genotype.—*A. punkata* sp. n.

Agoerodella punkata sp. n. Pl. 5. Figs. 1-6.

Insect yellowish; in the ♂, wings covered with hairs and scales; anterior, discoidal cell rather short and narrow, shorter than its footstalk; post-costal fold short, cell between it and the posterior border long and narrow; seventh apical cellule closed with a broad cross-vein just beyond the termination of the post-costal fold; neuration of the posterior wing irregular, no discoidal cell, only fork No. 1 present; basal joint of the antenna about as long as the width of the head with the oculi, shrouded in dense hair which, when removed reveals a close row of stout spines of varying length; the inner surface of the joint is excavated to leave a ridged hollow darkly pigmented towards its distal half; maxillary palpi two-jointed, basal joint long, stout and curved, terminal joint very small; spurs 1, 4, 4, anterior tibiae considerably dilated; femur in the type, notched on its inner surface towards its distal end.

Genitalia ♂.—The apical margin of the ninth tergite produced at its centre; beyond is a dorsal plate forming a pair of long, finger-like, parallel and adjacent processes arising above the centre of a broad, triangular plate; penis broad and short, slightly arched, apex excised; inferior appendages single-jointed and unbranched, tapering from broad bases to much produced and rounded apices.

Length of the anterior wing ♂ 7·5 mm.

Length of the basal joints of the antenna 1.25 mm.

N.-E. Burma: Punkataung, 16-iii-1934, R. Malaise.

Type ♂ in the collection of the Stockholm Museum.

Adinarthrella gen. n.

Spurs, 2, 4, 4, or 1, 4, 4. In the ♂, the basal joint of the antenna rather short and without processes. Maxillary palpi two-jointed, basal joint abnormally bent and thickened before the apex, terminal joint normal. Wings covered with hairs and scales; in the anterior, costa folded over the wing towards its base; post-costal fold varying in length. Inferior appendages with the apices branched but without an upwardly directed process at its base.

Genotype.—*A. brunnea* sp. n.

Adinarthrella brunnea sp. n. Pl. 6. Figs. 1-5.

Insect dark brown; in the ♂, basal joint of the antenna not very long, without any basal processes and slightly elbowed before the apex; it is furnished with the usual hairs and scales; maxillary palpi two-jointed, basal joint elbowed in the basal half and enormously dilated at the bend, then the joint is narrow to the apex, second joint slender, about the same length or slightly longer than the narrow part of the basal joint; wings clothed with hairs and scales, the latter mainly confined to the veins; anterior, costal margin rounded, the costa at its base, doubled over the sub-costa, enclosing a pencil of hairs; discoidal cell long and narrow; no median groove; post-costal fold rather long; in the posterior wing, the 4th apical cellule extending not so far inward as the basal angle of the discoidal cell; spurs 1, 4, 4.

Genitalia ♂.—9th tergite produced at its centre in two long, slender, triangles separated from each other by a narrow excision; penis rather long and straight, apex excised, a pair of very slender sheaths along the upper surface but the structure is difficult to make out; inferior appendages single-jointed, branched with a broad base extending for about half its length; seen from the side, there is a somewhat slender branch arising from the apex of the broadened half, apex inturned, from above; the apical portion of the appendage is thickened with a convex lower margin; the upper margin of the appendage along the basal half, is strongly sinuate or S shaped; from above, the apices are dilated and rounded, particularly in the inner margins.

Length of the anterior wing ♂ 7 mm.

Length of the basal joint of the antenna ♂ 1.5 mm.

Assam: Shillong, 5,000 ft., 20-31-x-1934, Fletcher coll.

Type ♂ and paratypes ♂ and ♀ in the collection of the British Museum.

Adinarthrella inconspicua sp. n. Pl. 7. Figs. 1-7.

Insect brown; in the ♂ wings clothed with hair and scales, much denuded in the type, broad and rounded; anterior with the costa bent over along the basal third and there bearing long, stiff hairs; discoidal cell long and narrow; a faintly indicated fold in the post-costal area terminating on the margin of a rather large and somewhat round cell; posterior wing with the nervure closing the discoidal cell very weak, perhaps absent in one wing; fork No. 1 sessile; basal joint of the antenna about as long as the width

of the head with the oculi; maxillary palpi two-jointed, basal joint very stout and rather short, slightly curved, terminal joint slender and inconspicuous; basal joint of the labial palpi short and stout slightly curved; spurs 2, 4, 4, those of the anterior tibiae conspicuous.

Genitalia ♂.—The apical margin of the ninth tergite produced in a large, bifid process with a minute, triangular process at its base; penis short and straight, apex slightly excised; sheaths long with very acute apices; inferior appendages apparently two-jointed, from beneath, broad at the base and produced in a slender process of about the same length as the basal part; from the side this produced portion has a small projection on each side of its base, the lower bearing a peg-like tooth; from beneath, the appendages are widely separated with a slight projection at the centre of each inner margin.

Length of the anterior wing ♂ 6 mm.

Length of the basal joint of the antenna 0.86 mm.

N.-E. Burma: Kambaiti, 7,000 ft., 11-v-1934, R. Malaise.

Type ♂ in the collection of the Stockholm Museum.

Adinarthrella kimsa sp. n. Pl. 8. Figs. 1-5.

Description of the male; head fuscous, clothed with dense fuscous hairs; oculi black; basal joint of the antenna rather short, fuscous, densely clothed with fuscous hairs, remaining joints very pale ochraceous or golden with dark fuscous annulations; maxillary palpi two-jointed, basal joint bent at right angles about midway, terminal joint short; labial palpi, basal joint, as long as the second but shorter than the third; wings ochraceous, anterior with the costa doubled over at the base and enclosing a pencil of hairs; there is a central, curved groove lined with dark scales and a fold parallel with the post-costa; pubescence short and golden, excepting in the folds where it is darker; fringes dark; legs ochraceous, spurs 2, 4, 4.

Genitalia ♂.—Ninth segment produced in the centre of its dorsal margin in two long processes divided from each other by a narrow excision; from the side, the process is broad at the base with a deep, angular excision on the under surface before the apex which is stout and downwardly directed; penis short and arched, the sheaths as in *Dinarthrum,* directed asymmetrically to one side but perhaps aberrant; inferior appendages single-jointed, stout, from the side, a small process arising from the upper margin towards the base, apex bifurcate, the forks lying one above the other, the upper more strongly chitinized than the lower which arises from a somewhat swollen basal portion; from beneath, the lower fork is constricted before the apex which is triangular, its obliquely truncate margin covered with strong spines; the lower margins of the appendages are fringed with strong hairs.

Length of the anterior wing ♂ 6 mm.

Length of the basal joint of the antenna 1·2 mm.

Sikkim: Kurseong, 18-30-iv-1922. Fletcher collection. Type ♂ in the collection of the British Museum.

Adinarthrella parva sp. n. Pl. 9. Figs. 1-7.

Insects small and yellowish. Anterior wing ♂ with the costa folded along rather more than its basal half; post-costal fold long, extending nearly to the border of the wing; four large cellules between it and the posterior margin, the two nearest the apex about equal in size, the next the largest, basal cellule small; wings covered with hairs and scales. There are additional forks in both wings in the ♀. Basal joint of the antenna in the ♂, rather longer than the width of the head together with the oculi, no processes at the base; maxillary palpi membranous, possibly two-jointed, basal joint stout and elbowed, terminal, slender and straight; spurs, 1, 4, 4.

Genitalia ♂.—Dorsal plate produced in a long triangle with an excised apex; from the side, the plate is deep at its base, tapering to a rounded apex, lower margin straight, upper sloping downward; penis short and stout with a pair of short, slender sheaths; inferior appendages bifurcate towards the apex, no basal branch but a slight, hooked projection of the upper margin about midway; upper fork, from the side, slightly shorter and more slender than the lower.

Length of the anterior wing ♂ 6 mm., ♀ 7 mm.

Length of the basal joint of the antenna ♂ ·86 mm.

N.-E. Burma: Kambaiti, 7,000 ft., 28-v-1934; 1-v-1934.

Type ♂ in the collection of the Stockholm Museum. Paratypes of both sexes in the Stockholm and the British Museums.

Goerodes Ulmer.

Goerodes Ulm., Coll. Selys, Fasc. 6(1), pp. 37-38, 1907.

Goerinella Ulm., Deut. ent. Zeit, **1915**, p. 67, 1915.

Crunobiodes Mart., Ann. Mus. Zool. Acad. Sci. U.R.S.S., 28, p. 471, 1927.

Spurs, 2, 4, 4. In the ♂, basal joint of the antenna without processes. Maxillary palpi one- or two-jointed. Wings with a clothing of either hairs or scales or both; costa sometimes folded over the wing, sometimes normal; post-costal fold varying in length. Penis-sheaths absent. Inferior appendages branched, always with an upwardly directed branch at the base. Dorsal plate generally in the form of a pair of spine-like processes but sometimes the processes are fused together to make a plate of varying shape.

Genotype.—*G. cornigera* Ulmer.

Goerodes indica Martynov. Pl. 10. Figs. 1-7.

Maniconeura indica Mart., Rec. Ind. Mus., xxxviii, pp. 289-291, figs. 60-62, 1936.

Insect brown generally; in the ♂, basal joint of the antenna about as long as the breadth of the basal part of the head without the oculi; second joint short, third longer than the second or succeeding joints; maxillary palpi two jointed, basal joint darkly pigmented and pressed closely in front of the face, terminal joint small

and membranous, transparent; wings clothed with hairs only; there are no intermingled scales; a fold in the post-costal region of the anterior wing in which the discoidal cell is long and narrow; neuration in the post-costal region slightly aberrant in the type; in the posterior wing, the base of the fourth apical cellule extends very slightly further inwards than the basal angle of the discoidal cell; spurs 2, 4, 4.

Genitalia ♂.—9th dorsal segment with a triangular production of the centre of its margin; beyond it extends a dorsal plate dilating immediately beyond the base, constricted again before the truncated and excised apex; the upper surface of this plate is set with peg-like spines or teeth; penis short, curved, with a dilated and excised apex; no penis sheaths, inferior appendages possibly two-jointed, branched; terminal joint welded to the apex of the basal joint; this terminal joint forms a plate with a broadened, obliquely truncate apex and carries two minute finger-like processes on its inner surface, one of which is furcate; from the side, there is the usual short, upwardly directed branch arising from the upper surface of the appendage towards the base, and from beneath, each appendage has a short, stout branch arising towards its base along its inner margin.

Length of the anterior wing ♂ 5 mm.

Type ♂ and paratypes ♂ and ♀ in the British Museum and in the collection of the Indian Museum, Calcutta, from Peninsular India, Castle Rock, N. Kanara District, ×.16; S. W. Kemp.

Ceylon: Matale, 4-i-24; Pundaloya, vii-98.

Goerodes inequalis Martynov. Pl. 11. Figs. 1-4.

Dinarthrodes inequalis Mart., Rec. Ind. Mus., 38, pp. 284-286, figs. 55-56 a-c, 1936.

Martynov describes the species as follows:—

'2♂, ♀. Western Himalayas, Kumaon Hills, Bhowali, bushes and trees, 12-v-30, H. S. Pruthi.'

'Head and thorax brown; head transverse; basal joint in ♂ antennae long, but shorter than the body, curved inwards, without any spines. Maxillary palpi densely clothed with greyish and black elongated scales, apparent basal joint probably represents an outgrowth of the palpiger; second (first) joint slender and directed upwards, third (second) joint slender, shorter than the foregoing. Labial palpi pale, fairly long, as usual three-jointed.'

'♂. Anterior wings greyish-yellow; DC elongated, but shorter than its pedicel; M dividing into two branches at the middle of DC, M_{3+4} near its base connected with a short cross-vein with CuA; this vein is long and curved at its end backwards and then prolonged with CuA_2; CuA_1 absent; cross-vein between CuA_2 and CuP long; before CuP and the basal part of A_1 is the anal groove with hairs, concealing the venation in the basal part. Posterior wings greyish, DC subelliptical; cross-vein rs-m connecting basal parts of RS_{3+4} and M_{1+2}.'

'♂. 9th segment broad, narrowed above; side pieces with convex hind margins; sternite provided with two brownish lateral, straight,

chitinous thickenings. Median portion of 10th segment elongated, with a narrow cleft divided into two portions, bearing short erect hairs; seen from the side this portion of the 10th segment is narrow at base, gradually thickening to its end. Side portions of 10th segment (morphologically they probably represent preanal appendages) extended as two long sinuate processes of unequal length, the left being considerably shorter than the right. The right process is directed backwards, then curved upwards and outwards; acute end portion is turned backwards; the left process is curved in a similar manner, but its end portion is directed somewhat inwards. Basal joint of the pedes genitales brown, thick, straight, bearing on its end portion a tuft of long bristles; second joint pale, almost twice shorter, slender in its middle, at base uniting with first joint; internally from it originates the inner slender branch, and from the base of the first joint arises on each side another pale slender process directed rather upwards. Penis slender, arcuately curved downwards (titillators invisible, probably shortened or absent).'

'♀. Anterior wings brownish, venation as usual in females; forks 1, 2 and 5 present. Basal joint of antennae somewhat longer than the head with eyes.'

'Length of body about 5-5.5 mm.'

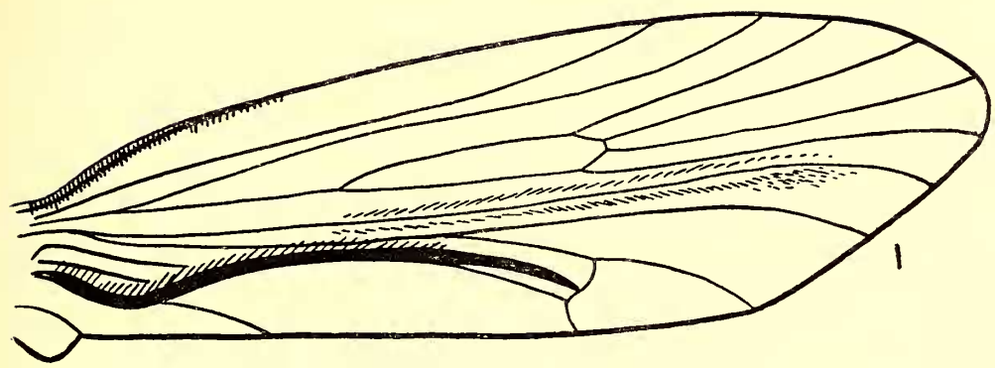
'Remarks.—Allied to *D. albardana* Ulm. but distinct, differing mainly in the structure of the 10th segment.'

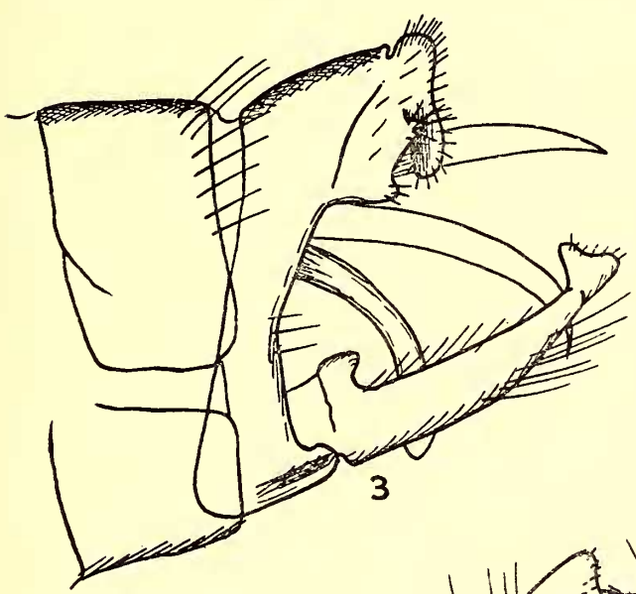
Co-types in the collection of the India Museum, Calcutta. I am unacquainted with this species.

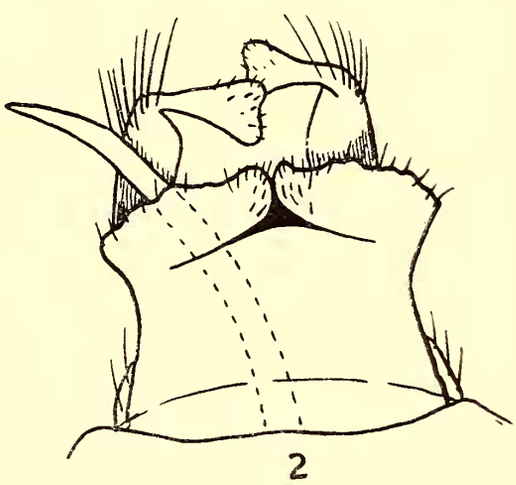
Goerodes kanda sp. n. Pl. 12 figs. 1-5.

Insects brownish; description of the ♂; basal joint of the antenna rather shorter than the breadth of the head with the oculi; maxillary palpi membranous, single-jointed with a small membranous nodule at the base and a sinuous apex; the whole palpi clothed with short broad scales with the lower half bearing long stiff hairs as well; the effect of this vestiture is to give to the joint the appearance of a bottle-brush; labial palpi, basal joint nearly as long as the second which is only slightly shorter than the third; wings, anterior, costal margin much more rounded than in *piscina,* costa folded over the sub-costa, rather more deeply towards the base; discoidal cell long and broad; post-costal fold extending practically the whole length of the wing, slightly dilated at the base; in the posterior wing, the fourth apical cellule extending further inwards than the basal angle of the discoidal cell; both wings clothed with scales as well as hairs; spurs 2, 4, 4.

Genitalia ♂.—The margin of the ninth dorsal segment produced in two pairs of processes, the outer, which are the longer, slightly asymmetric, stout at their bases, strongly chitinised, gradually tapering to acute apices; the inner are also strongly chitinised with broad bases side by side and touching each other in the lower half, then diverging widely; penis short, arching downward deeply







Dinarthrum latum sp. n. ♂. Fig. 1, Anterior wing. Fig. 2, genitalia dorsal. Fig. 3, lateral. Fig. 4, ventral.
(After Martynov.)